(3)

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Jerome MAILLOT, et al.

Serial No: 09/998,919 Group Art Unit: 2673

Confirmation No. 4265

Filed: December 3, 2001 Examiner: Unassigned

For: DYNAMICALLY ADJUSTED BRUSH FOR DIRECT PAINT SYSTEMS ON PARAMETERIZED MULTI-DIMENSIONAL SURFACES

LETTER TO THE EXAMINER SUBMITTING CORRECTED DRAWINGS

Assistant Commissioner for Patents
Washington, D.C. 20231

ATTENTION: OFFICIAL DRAFTSPERSON

Sir:

In accordance with the requirement in Notice to File Missing Parts, mailed December 17, 2002, applicant herewith submits 21 sheets of corrected drawings for filing in the subject application.

It is respectfully requested that the corrected and/or formal drawings filed herewith be entered in the above-referenced application.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 3/17/03

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PRIOR ART

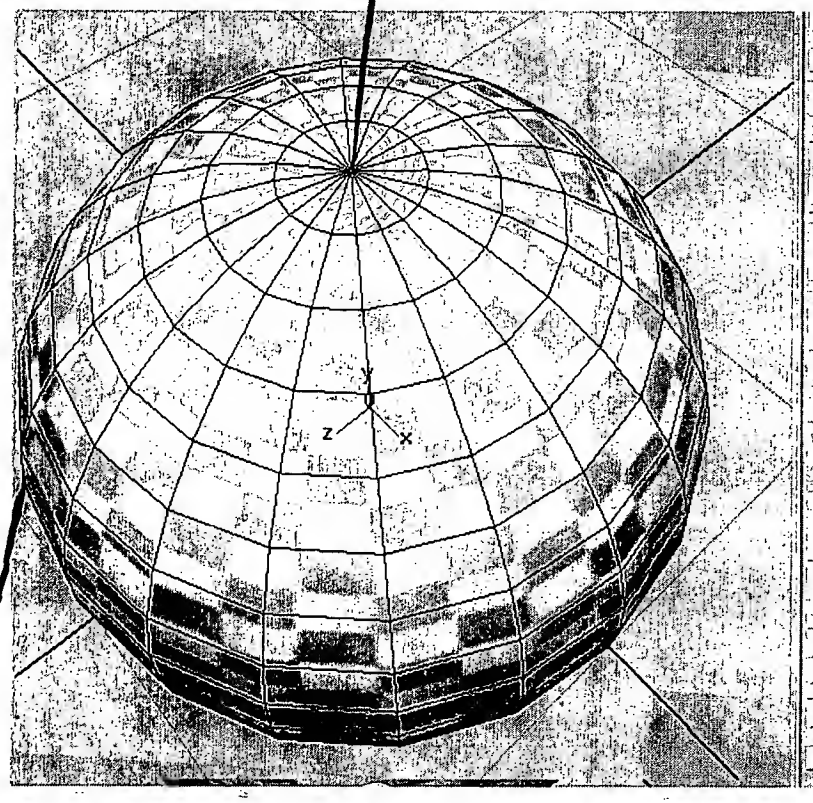


FIG. 1A

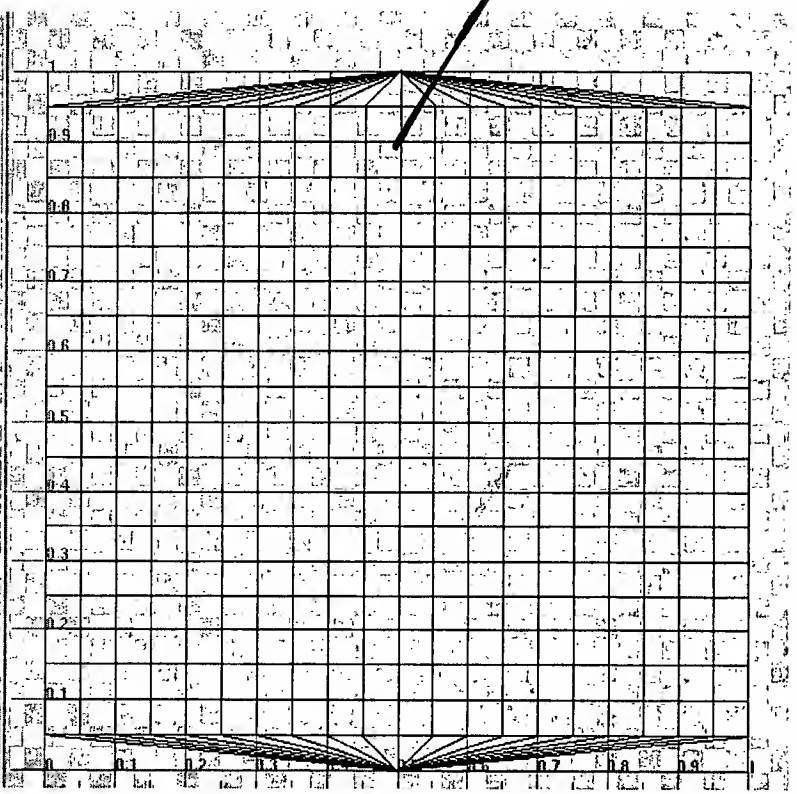


FIG. 1B

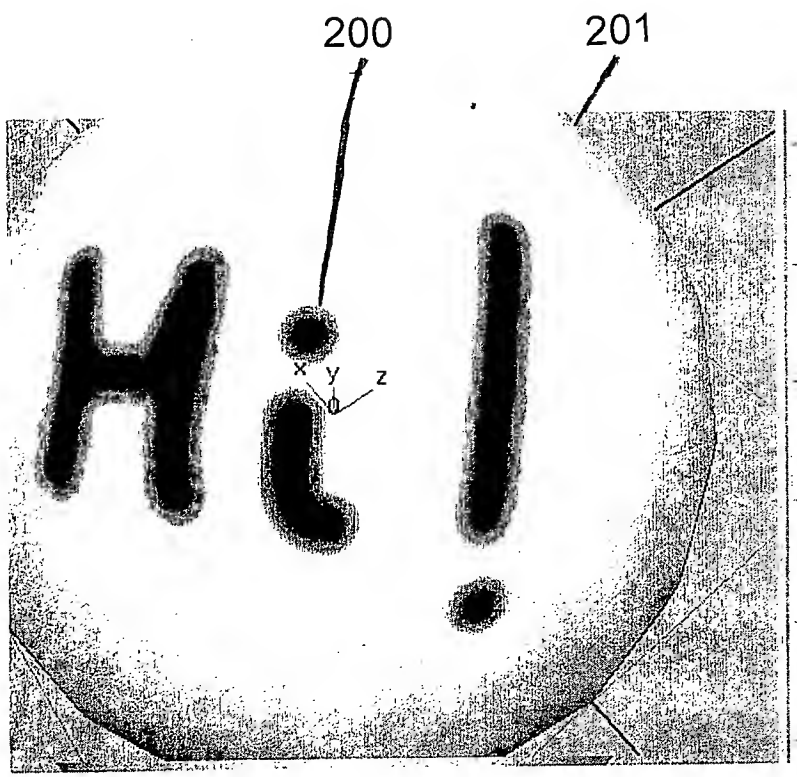


FIG. 2A

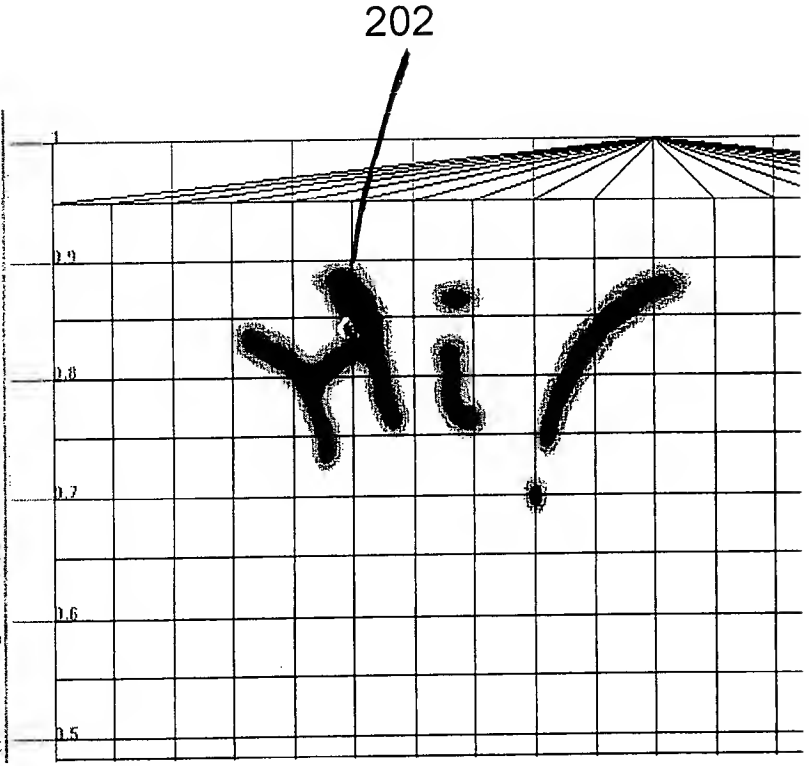


FIG. 2B

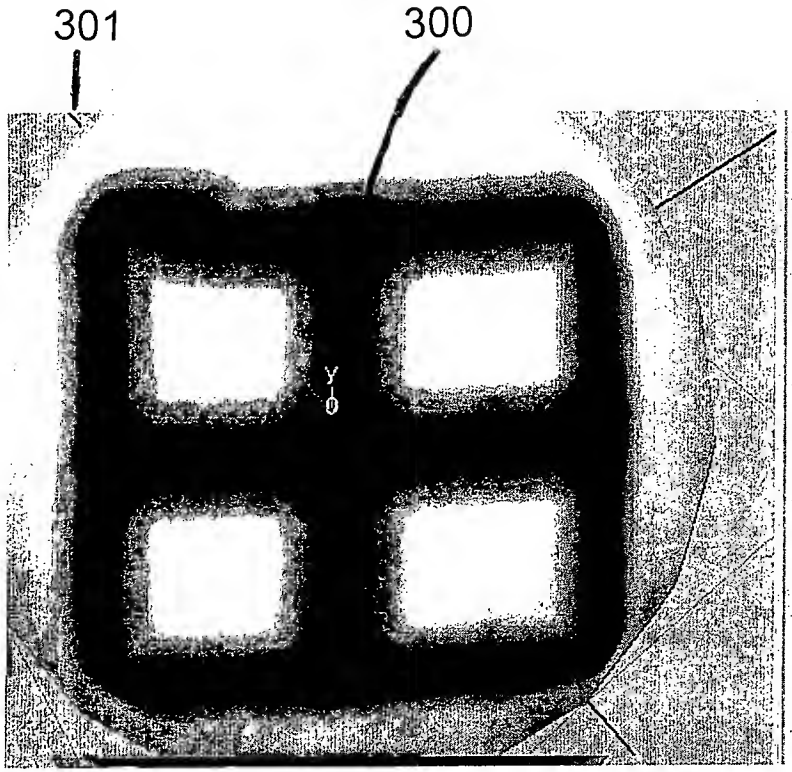


FIG. 3A

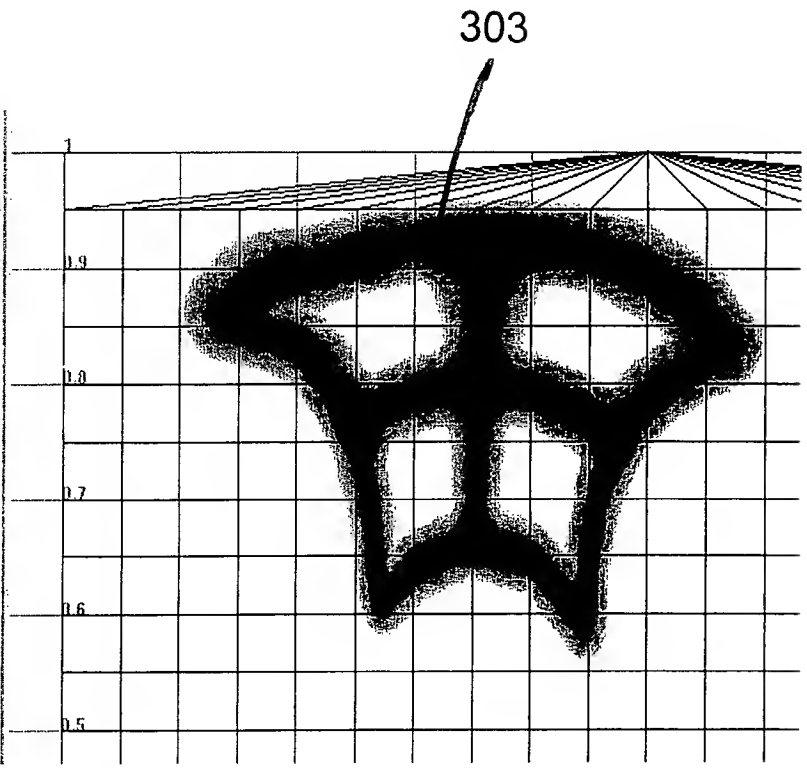
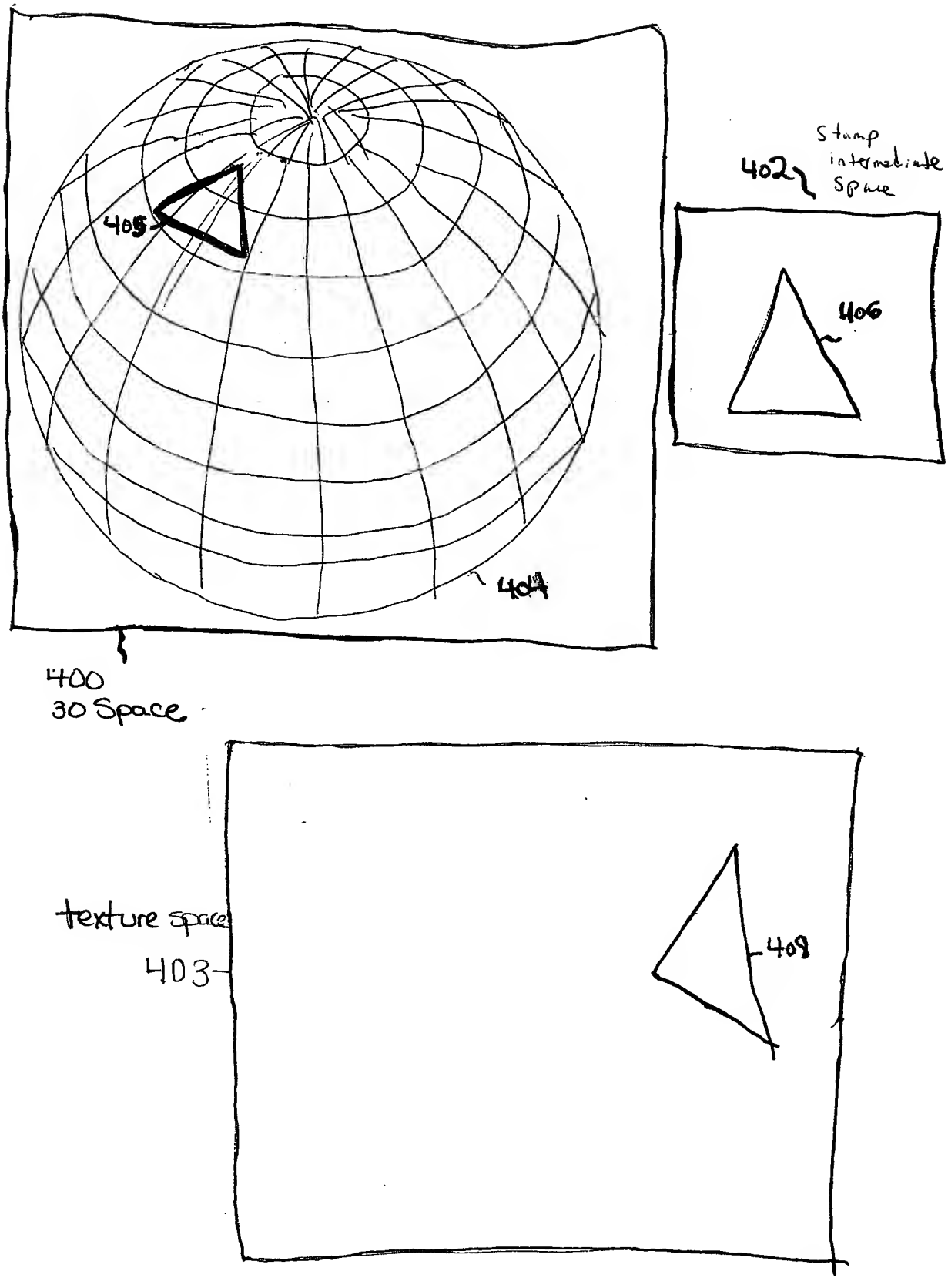


FIG. 3B

FIG. 4


405
404
400
3D Space
402
Stamp intermediate Space
406
texture space
403
409

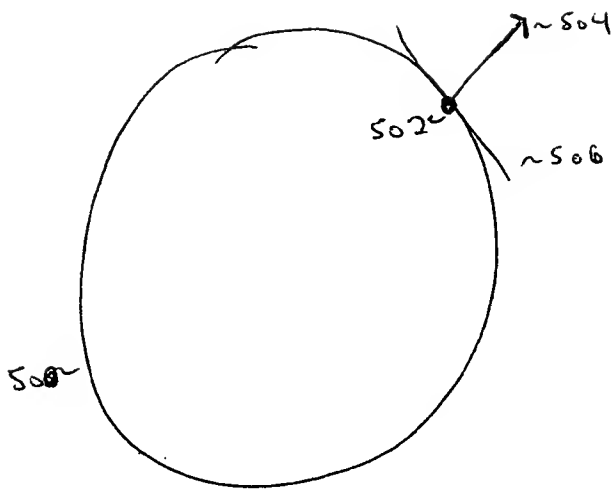


Fig. 5A

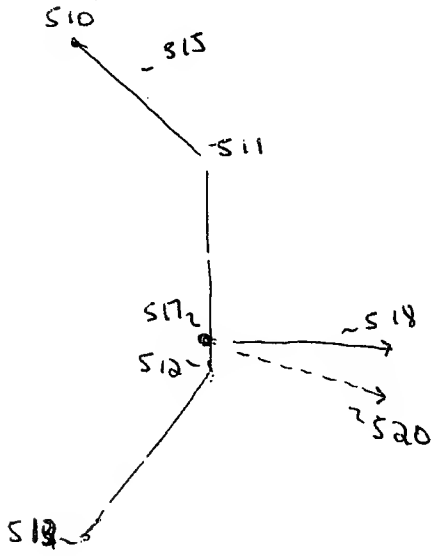


Fig 5B

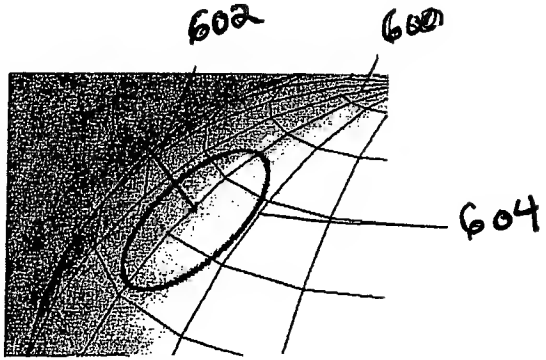


FIG. 6

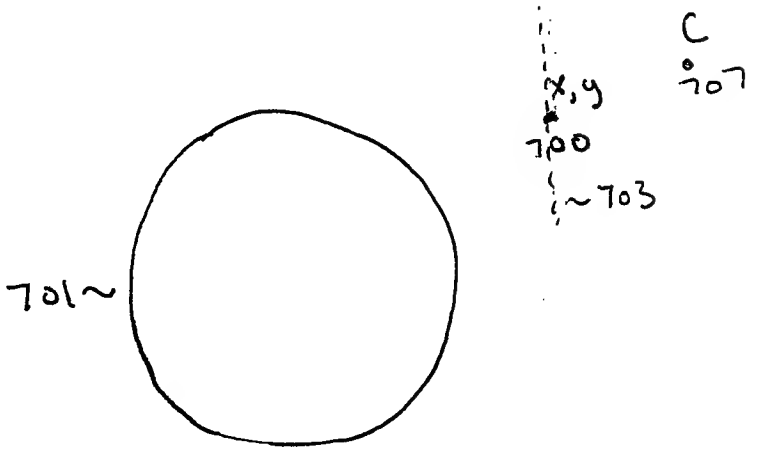


Fig 7A

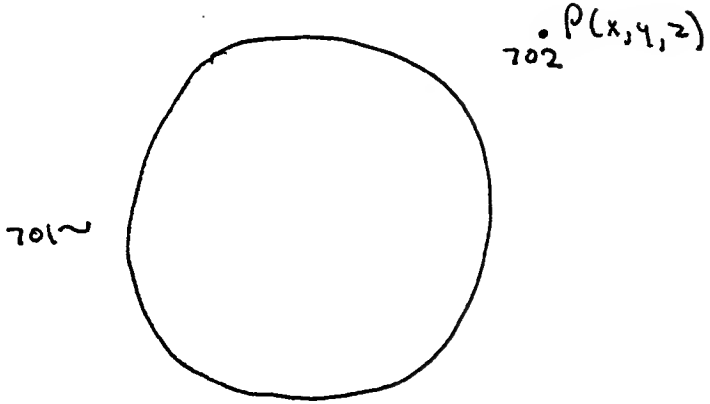


Fig 7B

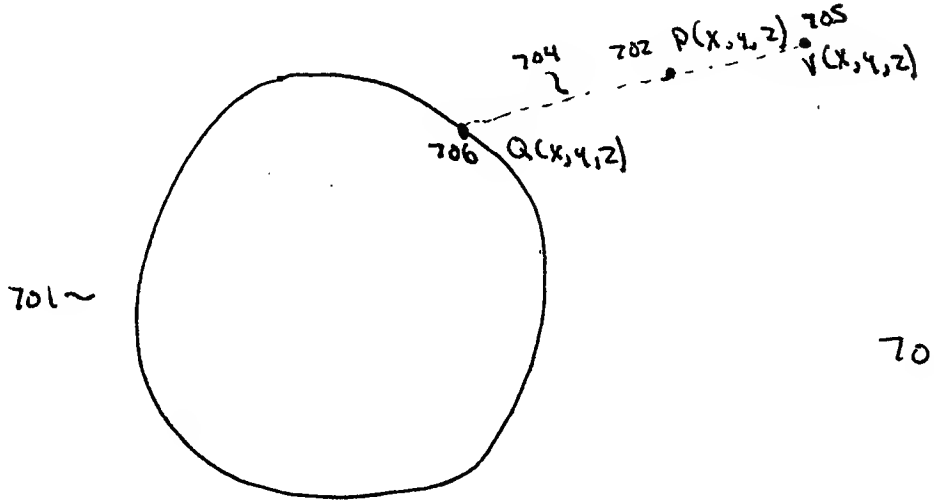


Fig 7C

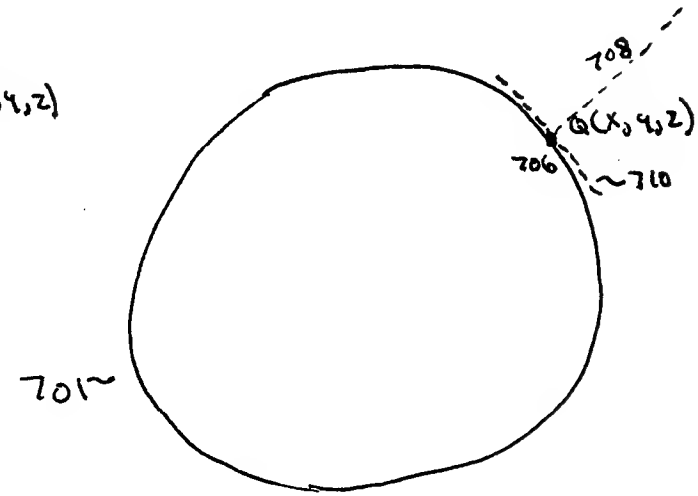


Fig 7D

Fig. 8

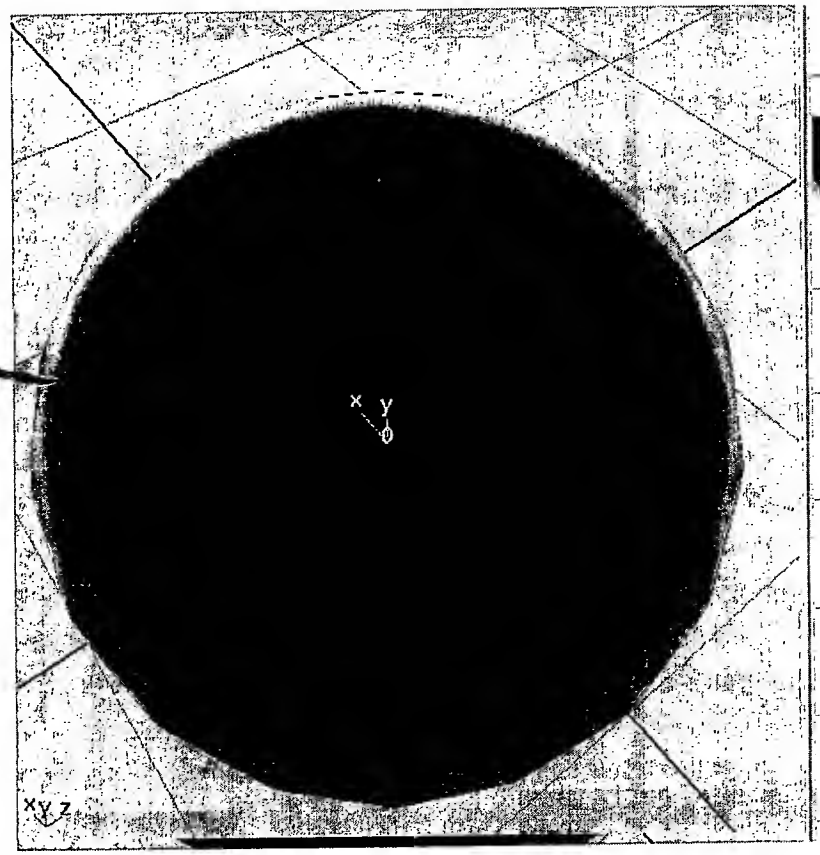


Fig. 9A

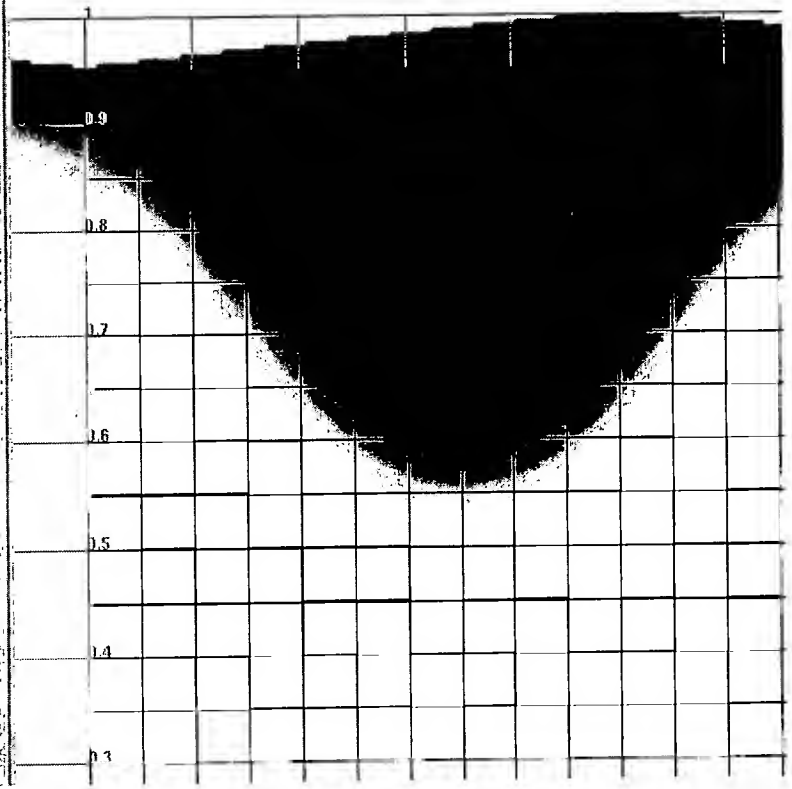


Fig. 9B

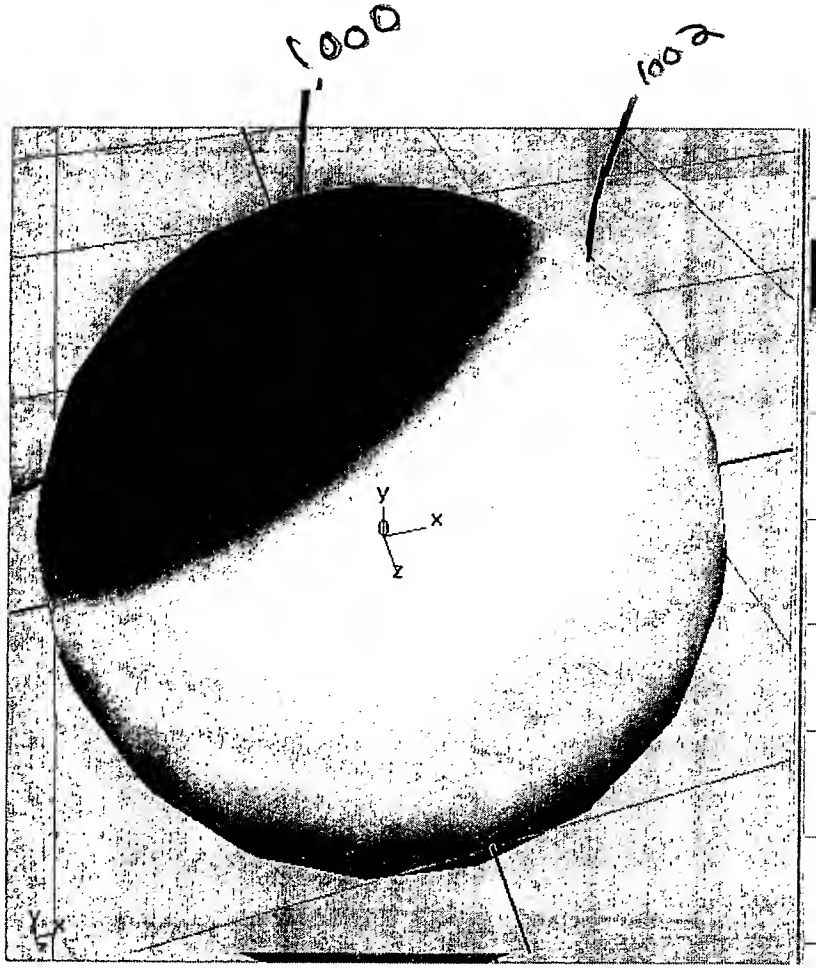


FIG. 10A

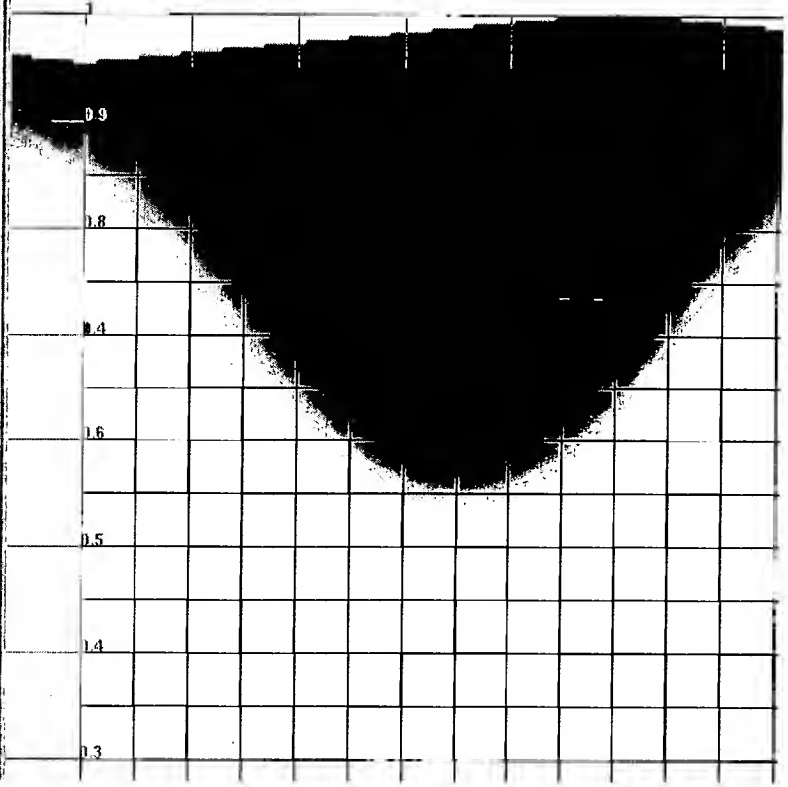


FIG 10B

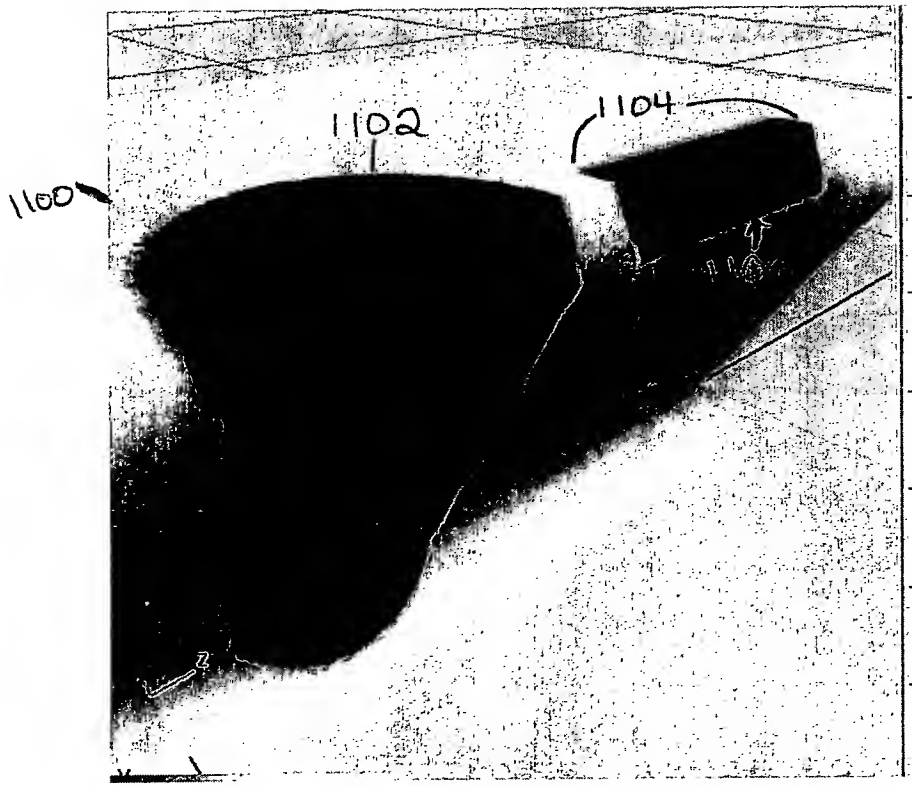


FIG. 11A

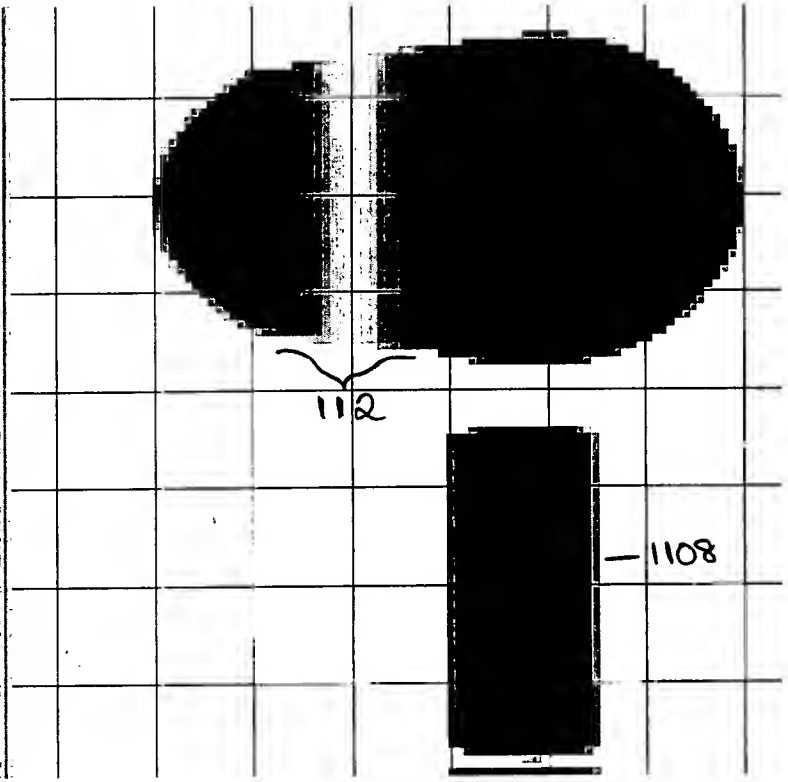


FIG. 11B

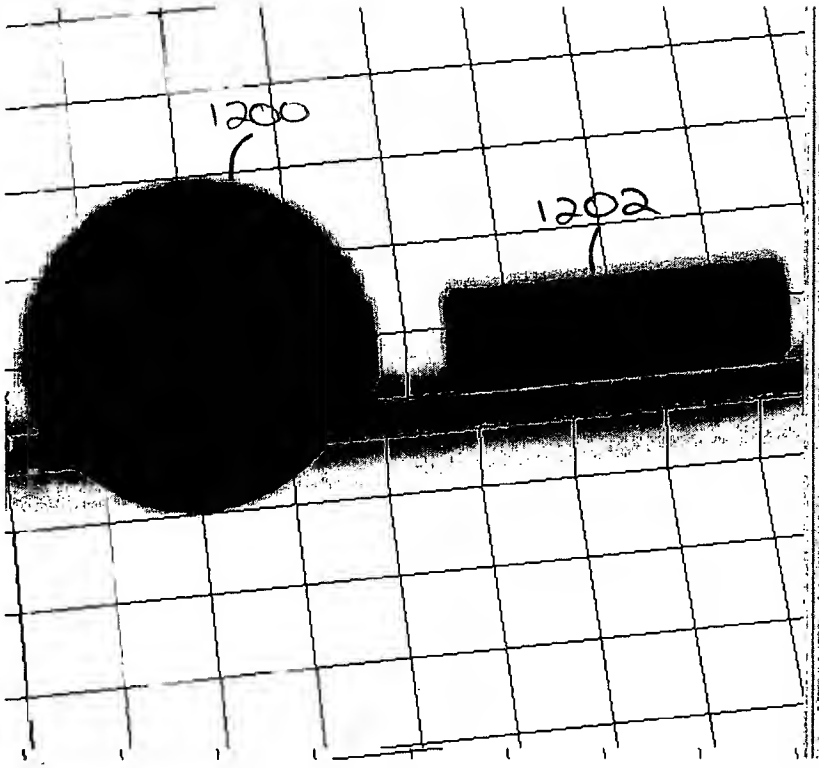


Fig 12A

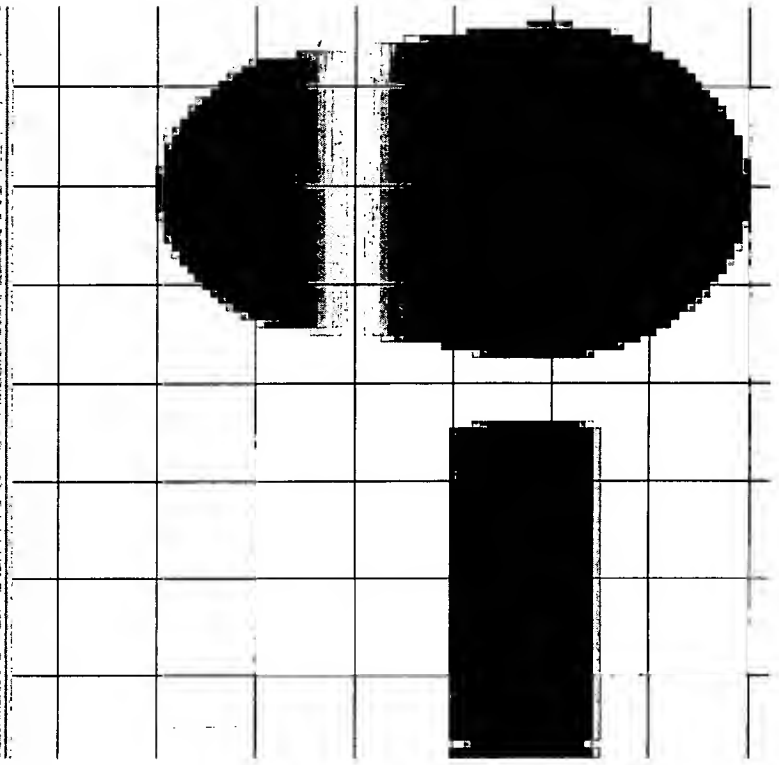


Fig 12B

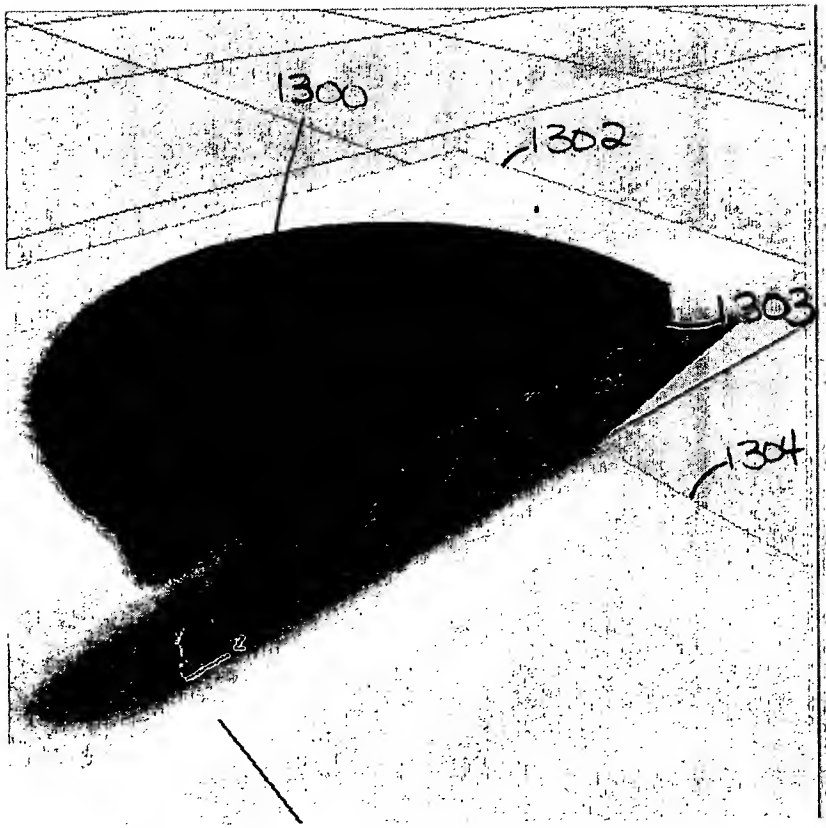


FIG 13A

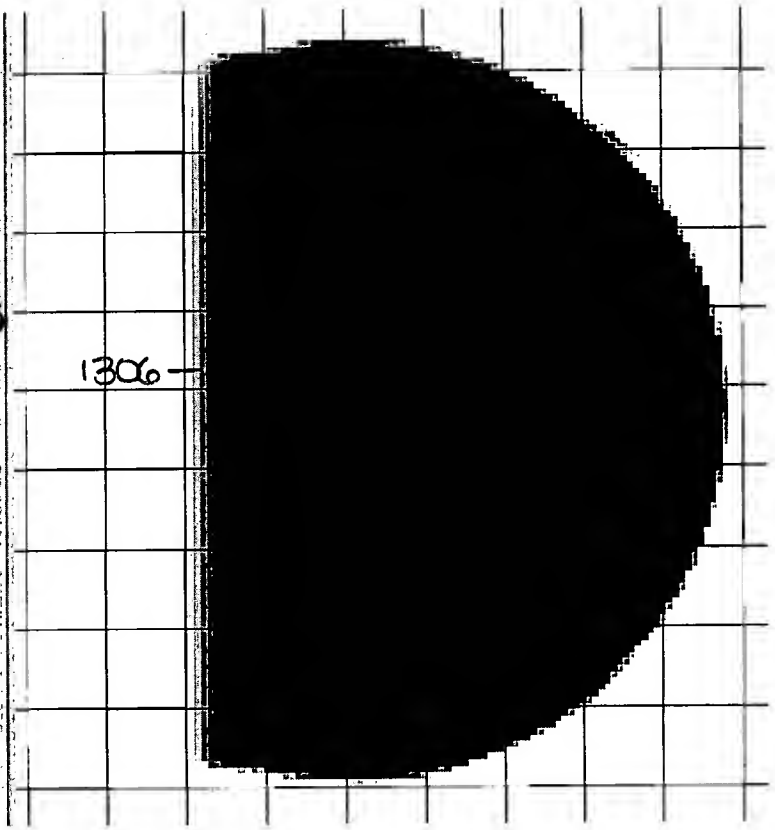


FIG 13B

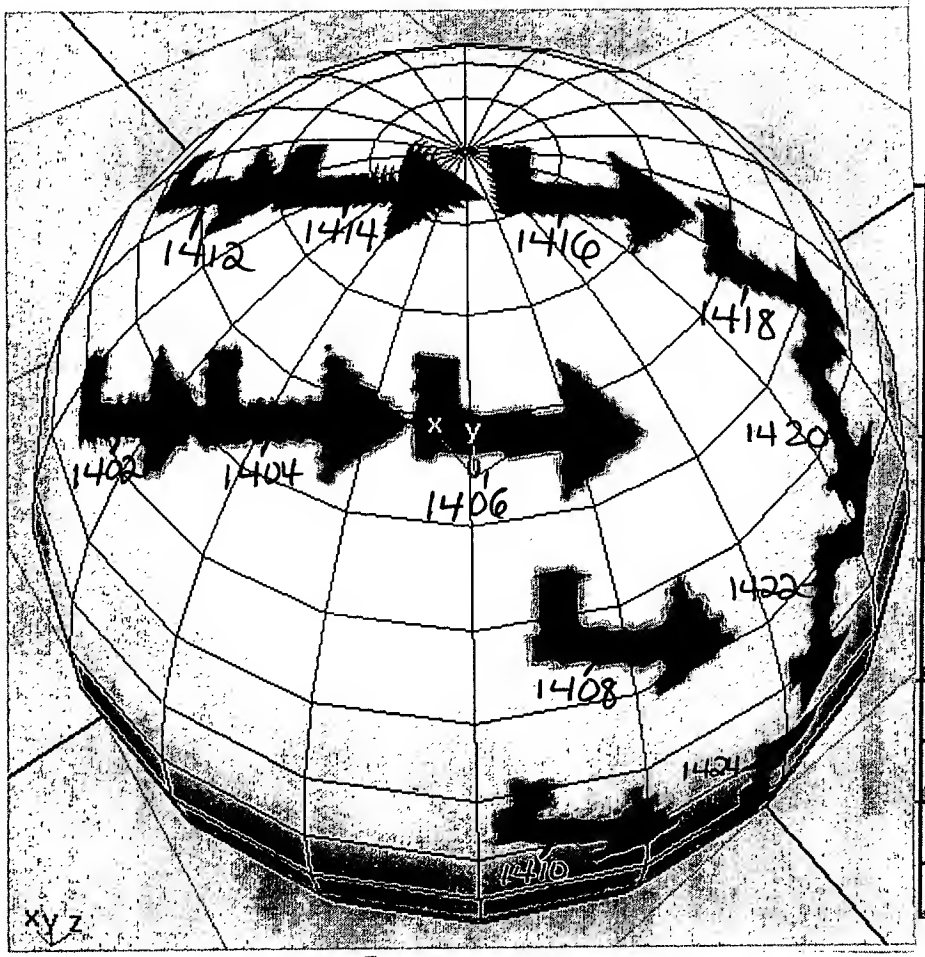


Fig 14A

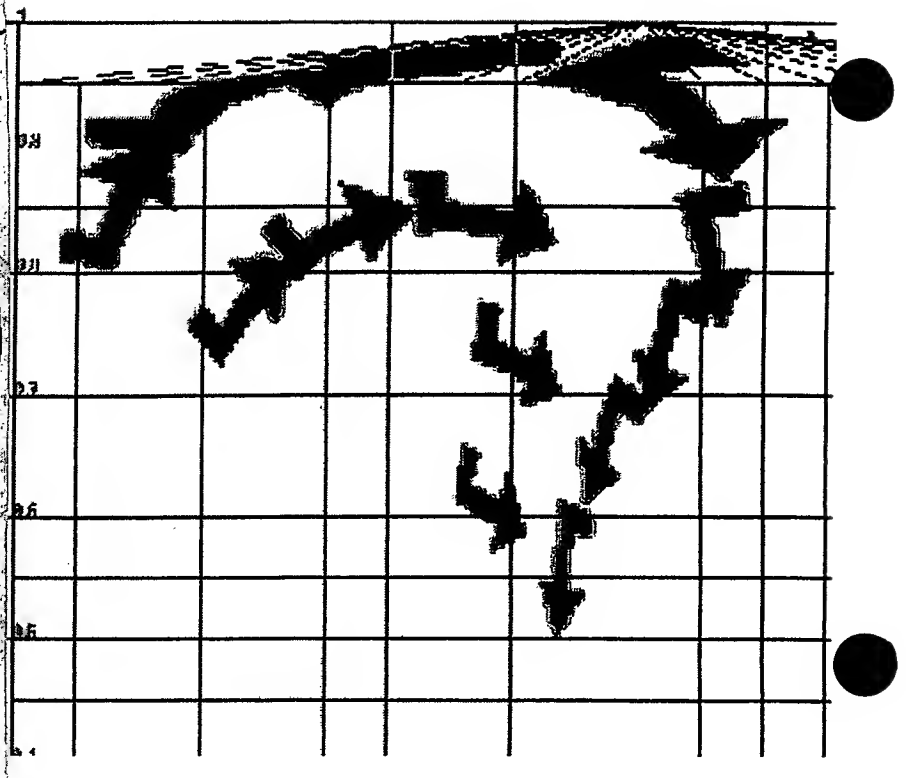


Fig 14B

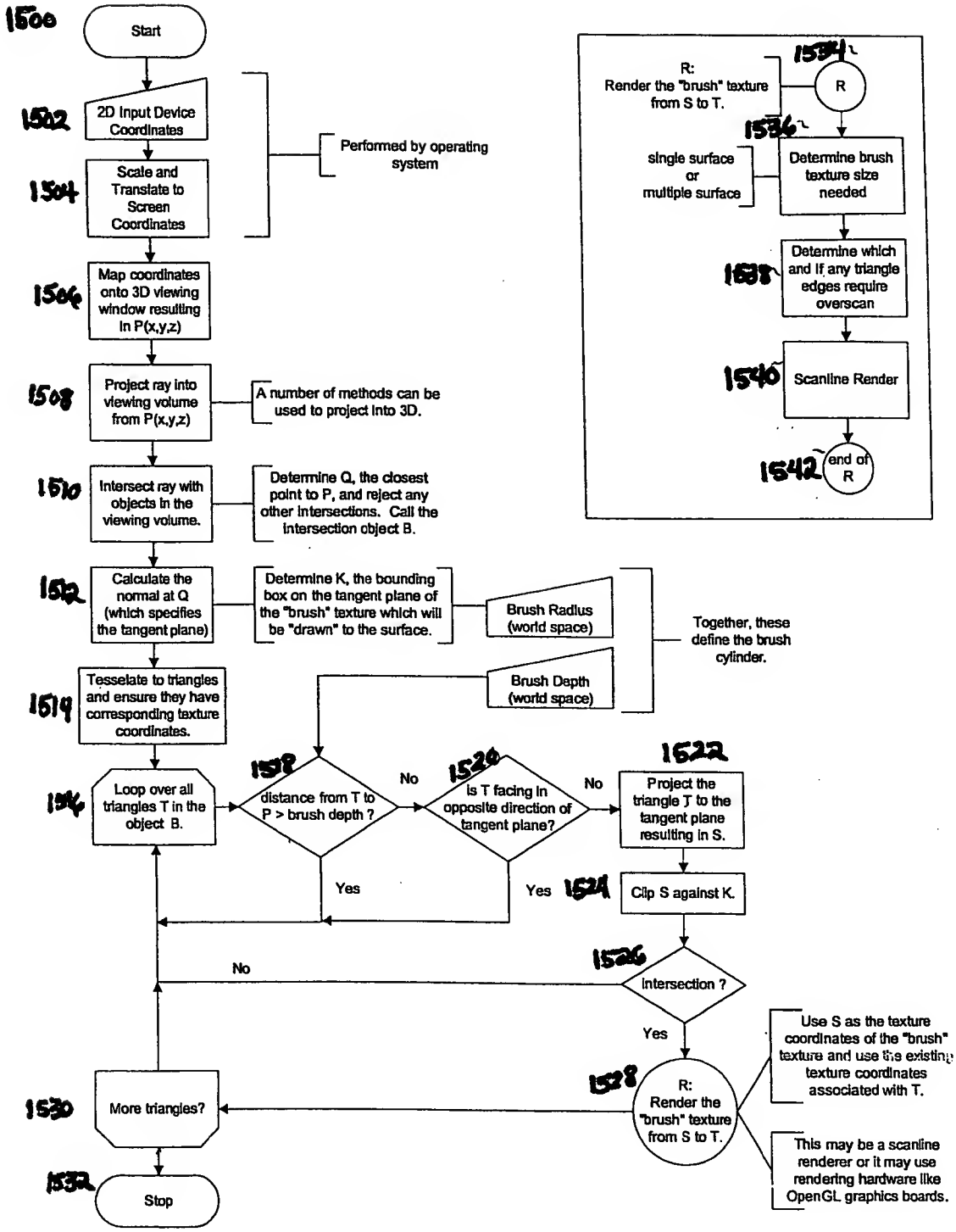
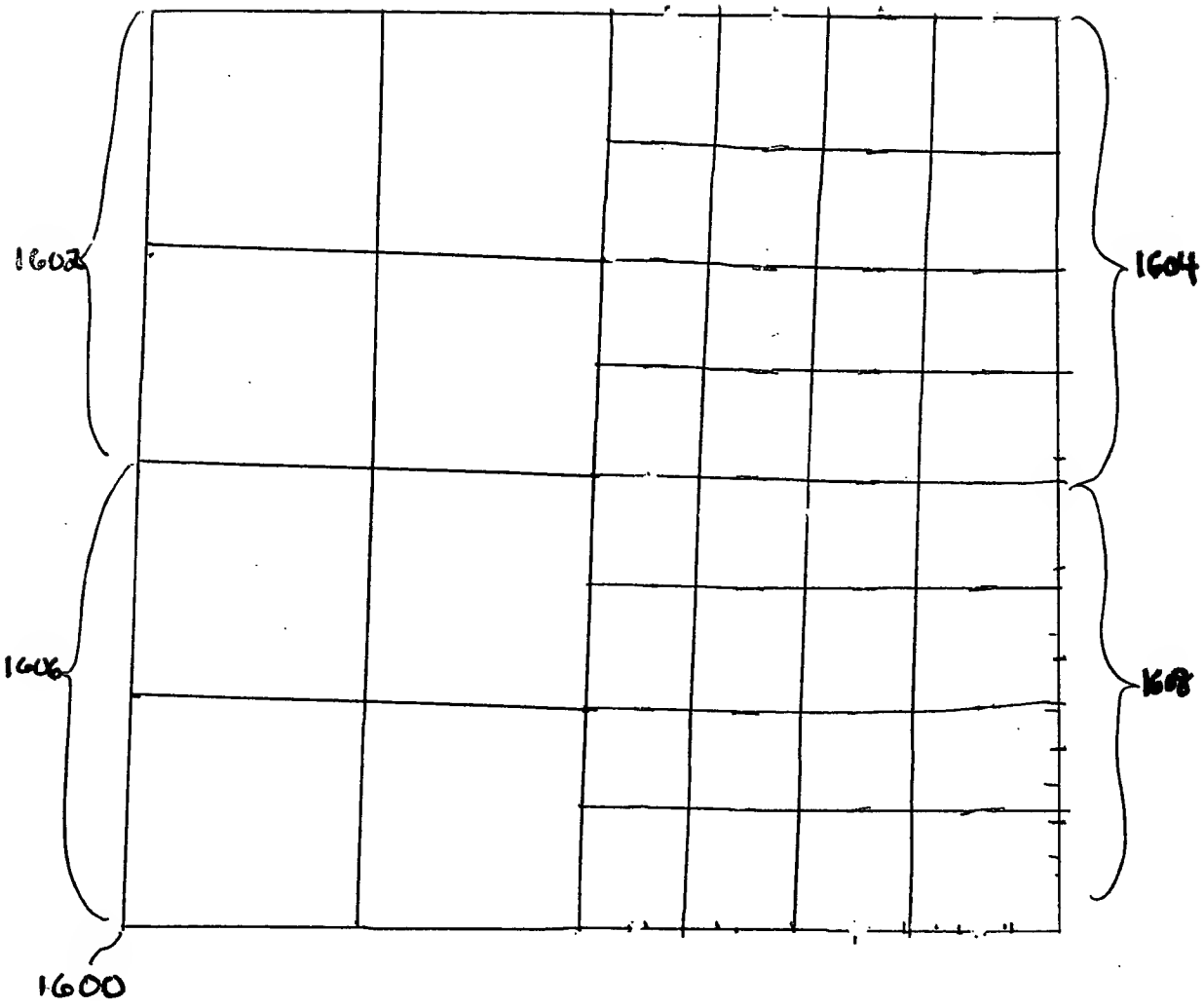
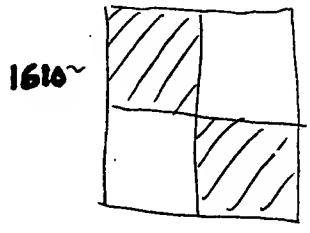

1500
Start
1502
2D Input Device Coordinates
1504
Scale and Translate to Screen Coordinates
Performed by operating system
1506
Map coordinates onto 3D viewing window resulting in P(x,y,z)
1508
Project ray into viewing volume from P(x,y,z)
A number of methods can be used to project into 3D.
1510
Intersect ray with objects in the viewing volume.
Determine Q, the closest point to P, and reject any other intersections. Call the intersection object B.
1512
Calculate the normal at Q (which specifies the tangent plane)
Determine K, the bounding box on the tangent plane of the "brush" texture which will be "drawn" to the surface.
Brush Radius (world space)
Brush Depth (world space)
Together, these define the brush cylinder.
1514
Tesselate to triangles and ensure they have corresponding texture coordinates.
1516
Loop over all triangles T in the object B.
1518
distance from T to P > brush depth ?
No
Yes
1520
is T facing in opposite direction of tangent plane?
No
Yes
1522
Project the triangle T to the tangent plane resulting in S.
1524
Clip S against K.
1526
Intersection ?
No
Yes
1528
R: Render the "brush" texture from S to T.
Use S as the texture coordinates of the "brush" texture and use the existing texture coordinates associated with T.
This may be a scanline renderer or it may use rendering hardware like OpenGL graphics boards.
1530
More triangles?
1532
Stop
1534
R: Render the "brush" texture from S to T.
R
1536
single surface or multiple surface
Determine brush texture size needed
1538
Determine which and if any triangle edges require overscan
1540
Scanline Render
1542
end of R

FIG. 15





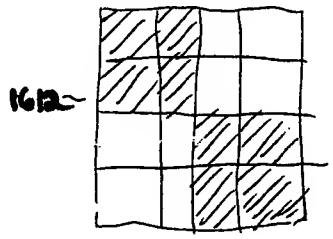


FIG. 16

After standard paint and overscan techniques are used, the image is processed to fill all the remaining background pixels: ⊗.
First step computes the mipmap levels keeping track of background pixels:
- If the 4 pixels at previous level are background pixels, the new one is background too.
- Otherwise, the color is the average of the non background pixels.

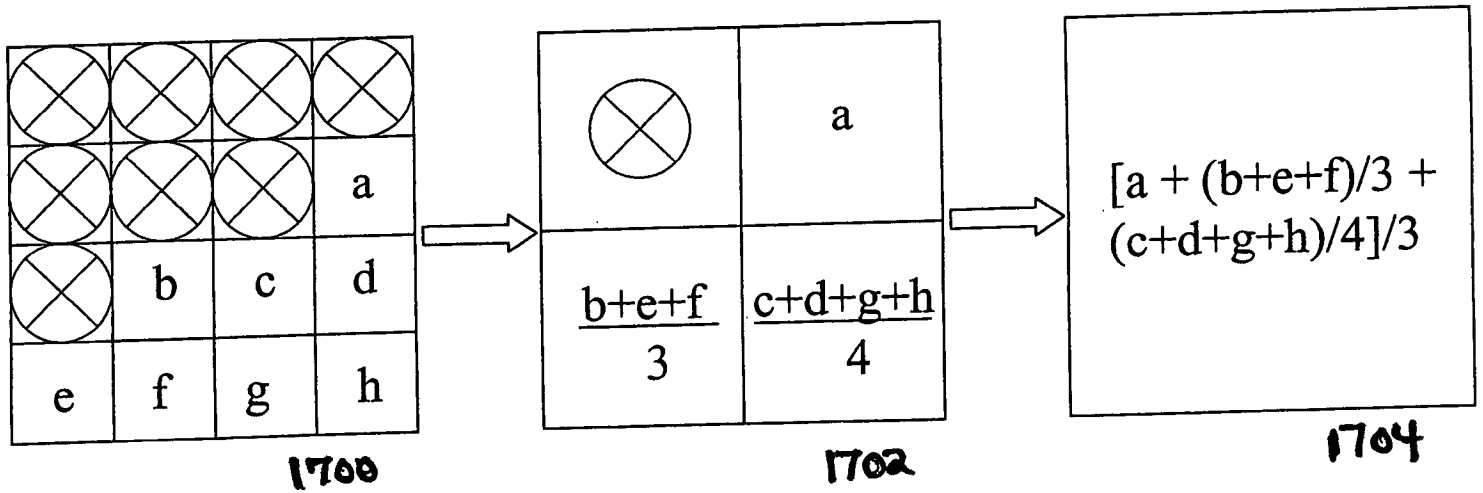


FIG. 17

Second step traverses the mipmap the other way, and assign the coarser level values to the corresponding background pixels.

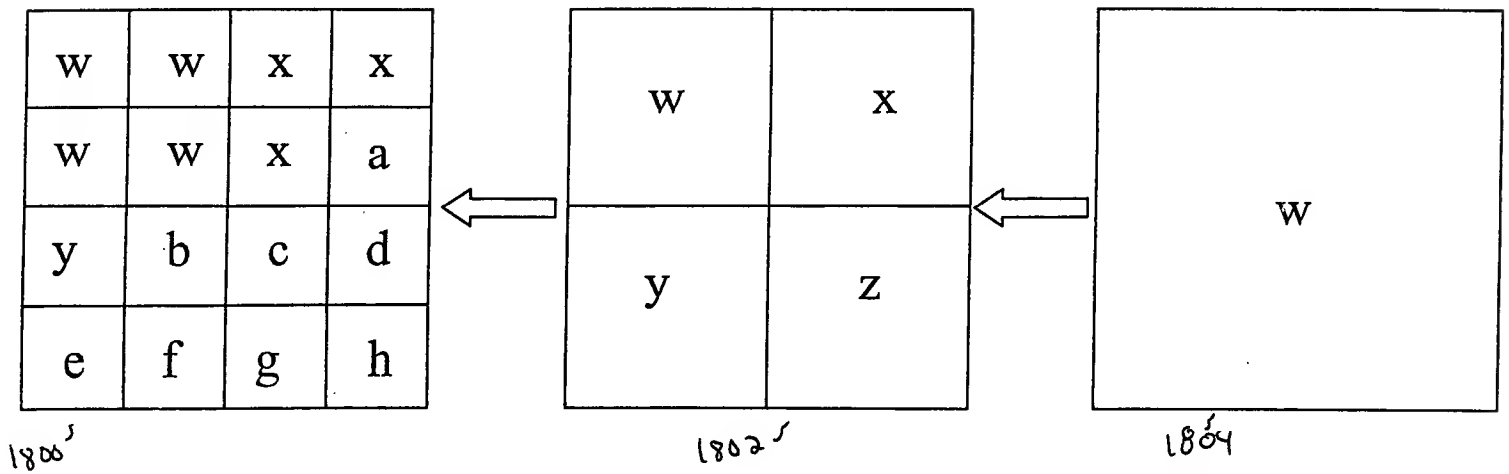


FIG. 18

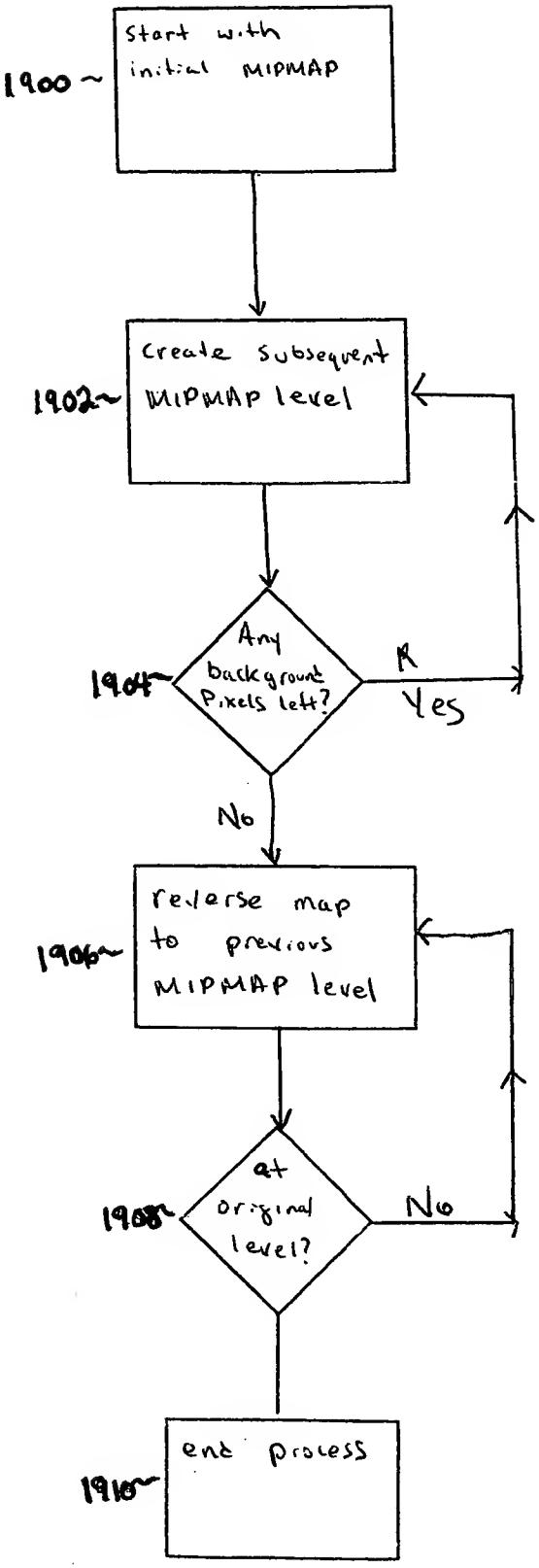

Start with initial MIPMAP
1900
Create subsequent MIPMAP level
1902
Any background Pixels left?
1904
Yes
No
reverse map to previous MIPMAP level
1906
at original level?
1908
No
end process
1910

FIG. 19

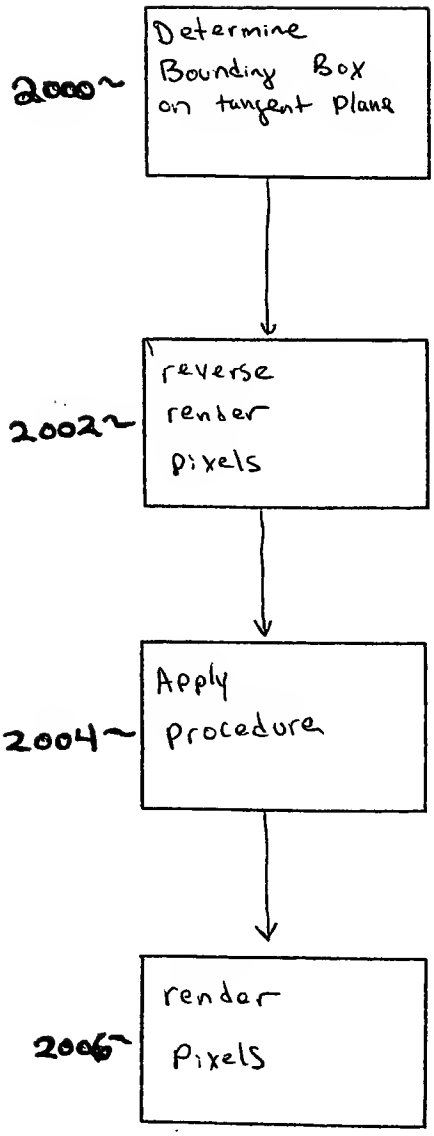

2000
Determine Bounding Box on tangent plane
2002
reverse render pixels
2004
Apply Procedure
2006
render Pixels

FIG. 20

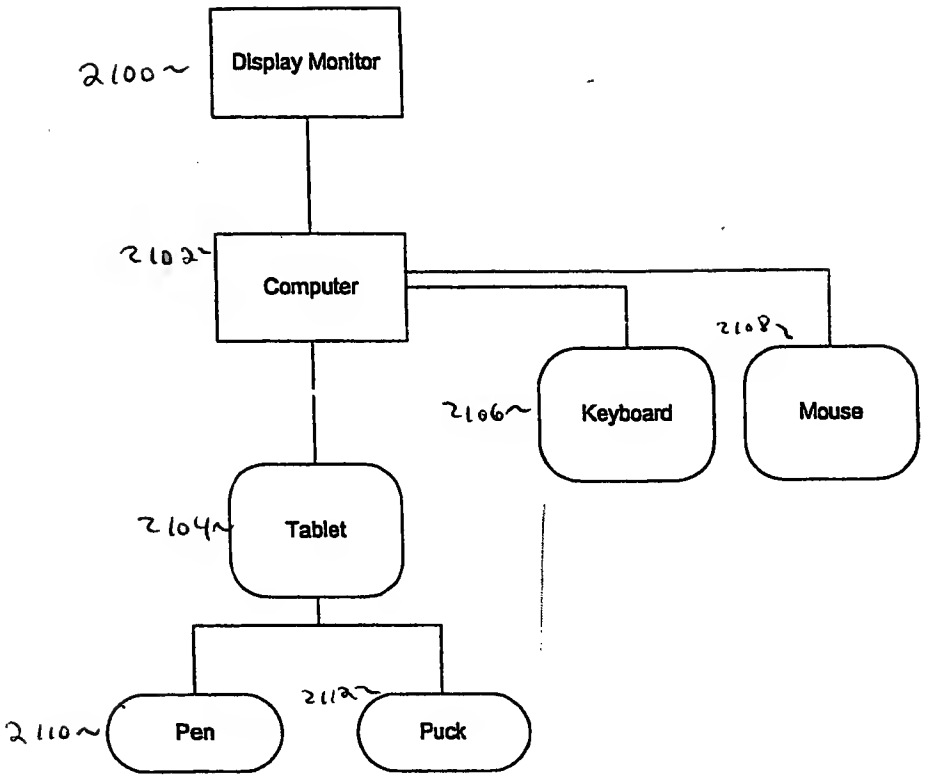

2100
Display Monitor
2102
Computer
2108
2106
Keyboard
Mouse
2104
Tablet
2110
Pen
2112
Puck

FIG. 21